

# SAFARI™ RAPTOR CLIENT

INTEGRATED WHITE SPACE BRIDGE AND 802.11n ACCESS POINT



FINAL CONFIGURATION MAY VARY

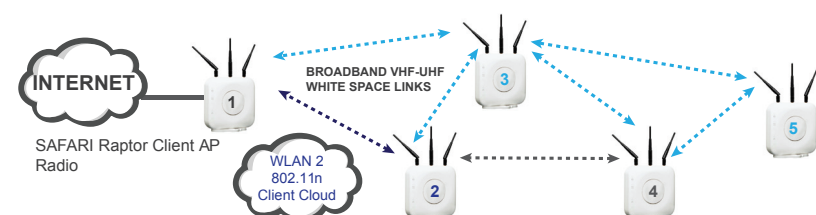
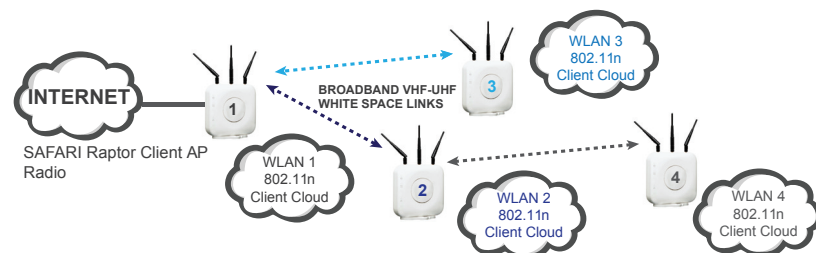
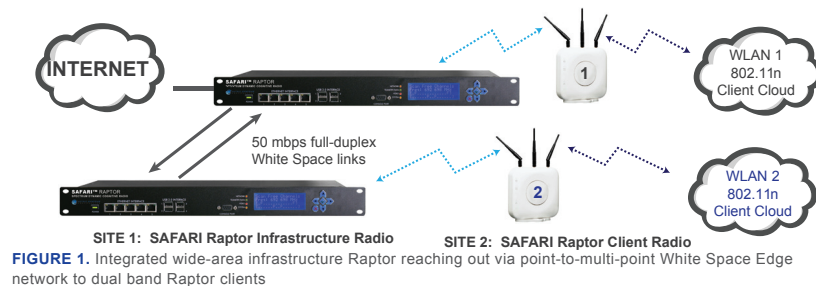
## SAFARI™ RAPTOR CLIENT

### WHITE SPACE AP BRIDGE & 802.11 N ACCESS POINT

The SAFARI™ Raptor Client is designed to either work together with its companion SAFARI™ Raptor Infrastructure element or independently to provide a White Space spectrum infrastructure between standard 802.11n devices and the core network to create more versatile and reliable broadband delivery capability for streaming video, voice and data.

The Raptor client supports three modes of operation (see **Figures 1-3**):

1. Long range connective point-to-point and multi-point Raptor Infrastructure radio networks
2. Stand-alone client networks: in-building, wide- and local-area networks
3. Mixed long and short range networks to create, for example, city-wide hot-spot coverage for education, public safety, health facilities and revenue commercial activities that utilize the newly available VHF and UHF TV band spectrum



## STANDARD FEATURES

- **Standard VHF and UHF operation:** 54-72, 76-88, 174-216, and 512-698 MHz. **Other bands available upon request.**
- **Total compatibility with FCC White Space database**
- Integrated 2x2 802.11n 2.4 GHz service
- Proprietary white space and 802.11n channel management system maintains **service to avoid interference**
- For international use, provides maximum versatility for the design and deployment of **WAN broadband networks** and **Edge network service**
- Maximum FCC allowable output: +30 dBm (higher output levels for export use)
- **Integrate highly efficient mesh network capabilities**
- **Continuous spectrum monitoring system** to minimize interference effects and payload loss
- White Space and WiFi antennas suppliers

## APPLICATIONS

### PUBLIC SAFETY, HEALTH AND EDUCATION

Integrated wide and local area networks

### DEFENSE

Quick reaction, fixed, mobile, and transportable networks for both emergency and temporary deployment

### INDUSTRIAL

Secure high-capacity, ultra-reliable backhaul and redundant infrastructure for SCADA and critical remote operation

### COMMERCIAL

Wider broadband area coverage for line-of-site (LOS) and non-line-of-site (NLOS) networks, ideal for external to internal structural communications

In-building and wide-area networks

### HOSPITALITY

One-to-many video, audio, and data distribution networks reduces deployment costs to maximize content delivery to guests

NLOS\*: "NON-LINE-OF-SIGHT"

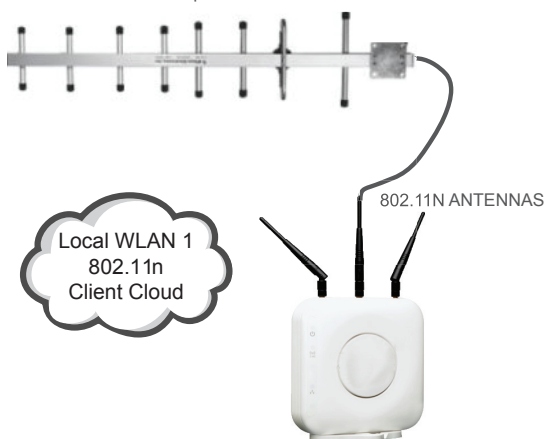
## BENEFITS

- Tolerant of **non-line-of-sight infrastructure links**
- **Less equipment needed than 2.4 or 5.8 GHz -based networks** for equivalent service
- Dynamically **resistant to interference**
- **Efficiently operates in forested and wooded areas**
- **More efficient infrastructure operations** than 2.4 GHz, 5.8 GHz and 3G/4G

## CAPABILITIES

- Operation in authorized VHF and UHF channels **provides over 350 MHz of potential usable spectrum** for short and long range services
- LOS and NLOS applications equivalent to **over a GB of data capability**
- **Nominal 50 mbps full duplex operations** between SAFARI™ Raptor nodes in each 6 MHz full duplex mode
- Spectrum discovery method: **geolocation database** or **optional spectrum sensing** and discovery covered by one or more U.S. and Canadian patents
- **Policy-based spectrum controls** allow operator-tailored revenue networks
- Offers integrated wide-area infrastructure and enterprise wireless support with **less infrastructure investment** and **on-going maintenance**

VHF/UHF EXTERNAL DIRECTIONAL ANTENNA enables link distances up to 10 km



**SAFARI CLIENTS CONFIGURED IN A POINT-TO-POINT EXTENDED RANGE CONFIGURATION** using an external directional antenna

## WHITE SPACE TECHNICAL SPECIFICATIONS MODEL #RCWiFi1

Standards and Certifications	Wi-Fi Alliance b, g, n (draft 2.0) certified Wi-Fi Alliance WPA and WPA2 certified Wi-Fi Alliance EAP certified Wi-Fi Alliance WMM certified IEEE802.11b IEEE802.11g IEEE802.11n (draft 2.0) IEEE802.11ab IEEE802.11af
FCC Equipment Classes	WS2 - White Space Device with Sensing - Mode 2  WG2 - White Space Device with Geo-location - Mode 2
Data Rates	<b>802.11g</b> 54, 48, 36, 24, 18, 12, 9 and 6 mbps  <b>802.11b</b> : 11, 5.5, 2, 1 mbps  <b>802.11n (draft 2.0)</b> : MCS 0 to 15 for HT20MHz, 6.5 - 130 mbps MCS 0 to 15 for HT40MHz
Frequency and Modulation Technique	<b>Signal Frequency</b> : 54-72, 76-88, 174-216 and 512-698 MHz  <b>802.11b</b> : DSSS (Direct Sequence Spread Spectrum)  <b>802.11g and 802.11n (draft 2.0)</b> : OFDM (Orthogonal Frequency Division Multiplexing) and DSSS
Software/Firmware	Compatible with OpenWRT AP Template provides quick activation DHCP server provides IP addressing Wireless STA (client) list MAC address filter VLAN handling Tunnel port policy
Wireless Settings	SSIP/Multiple SSID with VLAN Channel selection Transmission rate (Best, 54 through 1mbps) Max Transmit Power: 30 dBm Transmit power (full, half, quarter, eighth and minimum) Beacon interval (20 - 300) milliseconds: 100 defaults RTS/CTS threshold (0 - 2347) bytes: 2347
Antenna Support	External for White Space Internal for 802.11 g/n WiFi Note: Antennnas included with system

## Security

### WEP Settings: 802.1x, Open, Shared, and Open + Shared

Keys input type: HEX/ASCII  
Keys length: 64-bit, 128-bit, 152-bit and 256-bit  
Default WEP key to use (1 - 4)

### WPA-PSK Settings

Cipher type: TKIP  
Group key update interval: 300

### WPA2 Settings

Cipher key: AES/CCMP  
Group key update interval: 300

### WPA2-PSK Settings

Cipher key: AES/CCMP  
Group key update interval: 300

## Environmental

### Operating

Temperature: 0 - 40°C (32 - 104°F)  
Extended Temperature Range Available:  
-20°— 50°C

Relative humidity: 10% - 90% non-condensing

### Storage

Temperature: -25° - 75°C (-13 - 167°F)  
Relative humidity: 0 - 95°C non-condensing

Altitude: sea level to 40,000 feet

## Regulatory Compliance

Safety: EN 60950-1, IEC 60950-1, UL 60950-1 and ROHS Directive 2002/95/EC - EU

EMC/EMI: FCC part 15 Class B USA/ Canada, RSS 210 Canada and Directive 1995/5/EC - EU

## 802.11n TECHNICAL SPECIFICATIONS MODEL #RCWiFi1

### Standards and Certifications

Wi-Fi Alliance b, g, n (draft 2.0) certified  
Wi-Fi Alliance WPA and WPA2 certified  
Wi-Fi Alliance EAP certified  
Wi-Fi Alliance WMM certified  
IEEE802.11b  
IEEE802.11g  
IEEE802.11n (draft 2.0)  
IEEE802.11ab  
IEEE802.11af

### Data Rates

**802.11g** 54, 48, 36, 24, 18, 12, 9 and 6 mbps  
**802.11b**: 11, 5.5, 2, 1 mbps  
**802.11n (draft 2.0)**: MCS 0 to 15 for HT20MHz, 6.5 - 130 mbps MCS 0 to 15 for HT40MHz

### Frequency and Modulation Technique

**Signal Frequency**: 2.4GHz to 2.484 GHz  
**802.11b**: DSSS (Direct Sequence Spread Spectrum)  
**802.11g and 802.11n (draft 2.0)**: OFDM (Orthogonal Frequency Division Multiplexing) and DSSS  
Dual Band 2.4, 4.9 - 6 GHz available

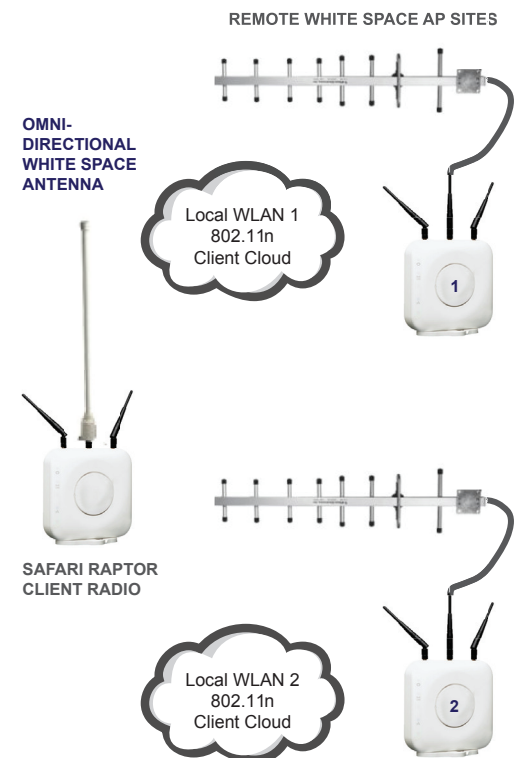
## SYSTEM OPERATION

The SAFARI Raptor Client internally combines a White Space and WiFi AP interconnected by a robust wireless-based router. This configuration provides the network designer with a powerful network tool to create both short and long-range secure networks.

The White Space side of the Raptor Client allows APs up to 15 km apart. The integrated 802.11n AP provides secure support for off-the-shelf WiFi-enabled devices. Integrated with the Infrastructure Raptor wide-area highly reliable networks becomes simple and cost-effective to implement.

## STANDARD CONFIGURATION OPTIONS

Outside Operation Model RCWiFi1-Ex allows -30°C to +60°C operation. This model supports POE and meets IP and NEMA6 rating.



**SAFARI CLIENTS CONFIGURED IN A POINT-TO-MULTIPOINT EXTENDED RANGE CONFIGURATION** using external omni- and directional antennas.

## 802.11n TECHNICAL SPECIFICATIONS MODEL #RCWiFi1 (CONTINUED)

Software/Firmware	Compatible with OpenWRT AP Template provides quick activation DHCP server provides IP addressing Wireless STA (client) list MAC address filter VLAN handling Tunnel port policy
Wireless Settings	SSID/Multiple SSID with VLAN Channel selection Transmission rate (Best, 54 through 1 in mbps) Transmit power (full, half, quarter, eighth and minimum) Beacon interval (20 - 300) milliseconds: 100 defaults RTS/CTS threshold (0 - 2347) bytes: 2347
Security	
<b>WEP Settings:</b> 802.1x, Open, Shared, and Open + Shared	Keys input type: HEX/ASCII Keys length: 64-bit, 128-bit, 152-bit and 256-bit Default WEP key to use (1 - 4)
<b>WPA-PSK Settings</b>	Cipher type: TKIP Group key update interval: 300
<b>WPA2 Settings</b>	Cipher key: AES/CCMP Group key update interval: 300
<b>WPA2-PSK Settings</b>	Cipher key: AES/CCMP Group key update interval: 300
Environmental	
Operating	Temperature: 0 - 40°C (32 - 104°F) Relative humidity: 10% - 90% non-condensing
Storage	Temperature: -25° - 75°C (-13 - 167°F) Relative humidity: 0 - 95°C non-condensing Altitude: Sea level to 40,000 feet
Regulatory Compliance	Safety: EN 60950-1, IEC 60950-1, UL 60950-1 and ROHS Directive 2002/95/EC - EU EMC/EMI: FCC part 15 Class B USA/Canada, RSS 210 Canada and Directive 1995/5/EC - EU



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**Please note:** this data sheet is for informational purposes only. The Raptor has not been certified by the FCC for sale in the U.S. Certification is planned for 2012. Export Applications do not require FCC approval but may require local and/or national approval for use. The Raptor Client will be certified in the following classes: (1) WS2 (White Space device with sensing modes) and (2) WGF (White Space device with geo-location mode).

